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Engineering & Environment, *Inc.*

BASEWIDE QUALITY ASSURANCE PROJECT PLAN
FOR
SITE AND LABORATORY ACTIVITIES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

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APPENDICES

1.0 Introduction

This Basewide Quality Assurance Project Plan (QAPP) presents the procedures designed to achieve comparability and defensibility regarding the reporting and use of analytical data from different sites and events on the Marine Corps Base, (MCB) Camp Lejeune (CLJ), North Carolina. It is to be used in conjunction with the Basewide Field Sampling Plan, which defines the remediation goals for each site. This QAPP, along with a Basewide Field Sampling Plan, make up the task-specific Basewide Sampling and Analysis Plan (SAP). The SAP provides assurance that data are collected, analyzed, reviewed, and reported in a consistent and representative manner. This QAPP is required reading for representative field and laboratory personnel involved in sample handling and data reporting for the CLJ projects.

2.0 Project Description

This QAPP for the MCB, CLJ, North Carolina has been prepared by E&E for the Department of the Navy, Atlantic Division (LANTDIV) under Contract Number N62470-03-D-4000. It is relevant to all analytical activity performed by E&E or E&E-subcontracted personnel. The following sections of this QAPP present policies to be used by field personnel and employees of the fixed-base laboratory to deliver usable and legally-defensible data.

2.1 Facility Location and Background

Camp Lejeune is a training base of the Marine Corps, located in Onslow County, North Carolina. The base covers approximately 236 square miles. Its southeastern boundary is State Route 24, and its western boundary is U.S. Route 17. The town of Jacksonville, North Carolina is north of the base.

CLJ was placed on the CERCLA National Priorities List in October 1989. Due to this listing a Federal Facilities Agreement (FFA) was entered into by Environmental Protection Agency (EPA) Region IV, the North Carolina Department of Environment, Health, and Natural Resources, (NCDENR) and LANTDIV. The FFA was established to ensure that environmental impacts associated with past and present activities at CLJ were thoroughly investigated. Following an investigation, corrective action alternatives in accordance with Comprehensive Environmental Response, Compensation and Liability Act/ Resource Conservation and Recovery Act (CERCLA/RCRA) must be developed and implemented as necessary to protect public health and the environment.

2.2 Scope of Work

Data quality objectives pertaining to each remedial and/or monitoring activity at CLJ can be found in task-specific SAPs. This Basewide QAPP gives detailed procedures for the reporting of valid data. There are specific policies to provide consistency of documentation, analytical quality control, instrument calibration and maintenance, and corrective action. Field personnel performing screening analytical tests and all subcontract laboratories shall comply with the policies herein.

3.0 Project Organization and Responsibilities

All project personnel are subject to the requirements of the SAP. Some of the key positions of personnel who are subject to the requirements of this QAPP are described in the following sections.

3.1 Regulatory Requirements

The Navy Installation Restoration Chemical Data Quality Manual and other such documents were used as reference material in the compilation of this QAPP. The EPA and/or the NCDENR may authorize some relevant documents used as guidelines for remedial activity at CLJ. This QAPP meets or exceeds guidelines set forth by Naval Environmental compliance documentation OPNAVINST 5090.1B Chapter 25, NAVSEA T0300-AZ-PRO-010, and National Environmental Laboratory Accreditation Program (NELAP) quality system requirements. LANTDIV is ultimately responsible for ensuring that current and applicable resources are available to the primary contractor.

3.2 Primary Contractor Tasks

E&E will procure laboratory services in accordance with standard policy. E&E will be responsible for ensuring that the laboratories' capabilities and qualifications are adequate to perform work under a Navy contract. Potential capacity issues will be addressed with laboratories prior to sampling activity. E&E is ultimately responsible for ensuring that all subcontracted laboratories comply with the Scope of Work (SOW), QAPP, HASP, and Field Sampling Plan (FSP).

3.3 Subcontractor Activities

All laboratory subcontractors will be provided copies of this Basewide SAP. Samples will be handled in accordance with the requirements of the FSP. The guidelines set forth in this QAPP will be used to determine validity and usability of analytical data. Any non-compliance with the procedures described herein must be addressed in writing. Communication lines between the laboratories and the Project Chemist will remain open to curtail unexpected deviations from standard policy.

3.4 Qualifications and Training of Personnel

Personnel involved with the project will be qualified to perform the tasks to which they are assigned. Said personnel will meet requirements set forth in OPNAVINST 5090.1B 25-5.8. This includes, but is not limited to, basic sampling techniques, field testing methodology, task specific sampling methods, maintenance of environmental paperwork, and how to avoid cross contamination. In addition to education and experience, specific training may be required to qualify individuals to perform certain activities. Training will be documented appropriately and filed as a project record.

4.0 Quality Program

The following sections discuss data quality measurements and provide specific calculations for the steps that will be taken to ensure the validity of the data acquired during CLJ project activities.

4.1 Data Quality Indicators

Precision, accuracy, representativeness, completeness, and comparability (PARCC) are data quality objectives (DQO) used to establish consistency in data submitted by different laboratories and/or for different sites at CLJ.

4.1.1 Precision

Precision is defined as a measurement of mutual agreement among individual measurements of the same property, usually under "prescribed similar conditions." Precision will be expressed in terms of the Relative Percent Difference (RPD) between duplicate determinations. Various measures of precision exist depending on the prescribed similar conditions.

Analytical precision is the measurement of the variability associated with duplicate (two) analyses. The Matrix Spike/ Matrix Spike Duplicate (MS/MSD) will be used to determine the precision of the analytical method. If the RPDs of analytes in the MS/MSD are within established control limits, then precision is acceptable.

Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix spiked duplicate samples shall be analyzed to assess field and analytical precision, and the precision measurement is determined using the RPD between the duplicate sample results.

RPD is defined as the difference between two measurements divided by their mean and expressed as a percent. As previously stated, the RPD will be used to assess the total and analytical precision of duplicate measurements and will be calculated as shown in the following equation:

$$Relative\ Percent\ Difference\ (RPD) = \left[\frac{|D_1 - D_2|}{\frac{D_1 + D_2}{2}} \right] X\ 100$$

where:

D_1 = the result from the original determination
D_2 = the result from a duplicate measurement.

Analytical and total precision will be calculated for each analytical batch generated for CLJ. The associated sample results will be reviewed, evaluated, and quantified based on these specific measurements.

4.1.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It therefore reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard.

Analytical accuracy is assessed through the analysis of spikes such as MS/MSDs and LCSs, or performance evaluation samples and calibration check samples. With the MS/MSDs that are spiked into the actual sample matrix and analyzed, these accuracy indicators must take into account the nature of the matrix in question; the native compounds may adversely affect spike recovery and yield less than conclusive data. Accuracy checks that focus on analytical method and consist of compounds spiked in a "blank" or no interfering matrix (e.g., LCSs, Permissible Exceedences (PEs), or calibration check samples) address the accuracy of the method and/or instrumentation at detecting the target analyte(s) at a certain quantification level and are not considered to be subject to matrix effects.

Accuracy is typically measured as percent recovery. The percent recovery determinations will be performed as shown in the following equation:

$$Percent\ Recovery = \left(\frac{(X - S)}{T}\right) x\ 100$$

where:

X = the experimentally determined concentration
S = the sample concentration before spiking
T = the "true" concentration.

4.1.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data actually represent the matrix conditions. For example in conducting groundwater monitoring, representativeness requires proper location of wells and the collection of samples under consistent, documented procedures. Wells are located based upon the results of the hydrogeology study in progress and are designed to provide maximum coverage of the flow conditions. Requirements and procedures for sample collection and handling are designed to maximize sample representativeness. Representativeness can also be monitored by reviewing field documentation and by performing field Quality Assurance (QA) audits.

Objectives for representativeness are defined for each sampling and analysis task in the task-specific SAPs and are a function of the site-specific investigative objectives. Representativeness will be achieved through the use of standard field, sampling, and analytical procedures.

4.1.4 Completeness

Data completeness represents the percentage of valid data collected from a sampling/analytical program or measurement system compared to the amount expected to be obtained under optimal or normal conditions. Completeness is calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not qualified as rejected in the data review and validation process. The requirement for completeness is 90 percent of all solid matrix and 95 percent for all aqueous matrix critical field samples requiring chemical analyses. For any instances of samples that could not be analyzed for any reason (holding time violations in which re-sampling and analysis were not possible, samples spilled or broken, etc.), the numerator of this calculation becomes the number of valid results minus the number of possible results not reported.

The formula for calculation of completeness is shown in the following equation:

$$\%\, completeness = \frac{number\ of\ valid\ (i.e., non\text{-}R\ \ flagged)\ results}{number\ of\ \ possible\ results}$$

4.1.5 Comparability

Comparability is the confidence with which one data set can be compared to another data set. The objective for this Quality Assurance/Quality Control (QA/QC) program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability.

Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, and using standard and comprehensive reporting formats. Complete field documentation using standardized data collection forms shall support the assessment of comparability. Analysis of PE samples and reports from audits shall also be used to provide additional information for assessing the comparability of analytical data produced by multiple laboratories. Historical comparability shall be achieved through consistent use of methods and documentation procedures throughout the project.

4.2 Method Detection Limits and Reporting Limits

Method Detection Limits (MDLs) are determined as required in Section 40 Code of Federal Regulations (CFR) Part 136, Appendix B. Chapter 1 of SW-846 presents the procedures to determine MDLs on each instrument for each analyte on the standard laboratory reporting list for general soil and water matrix samples. The MDLs are recorded, documented, and updated annually. After the MDLs are generated, the laboratory establishes its Reporting Limits (RLs), which are higher than the MDL but below the project-required action limit to meet the analytical objectives in all cases. As the MDLs are re-evaluated, the RLs may be adjusted to reflect the new MDL. When this occurs, the laboratory will notify the Project Chemist, and the revised limits will be compared to the project requirements to ensure that the limits still meet the analytical objectives. If they do not, alternate preparation and analysis methods will be employed to lower the RLs so that the project target level can be attained. The task-specific SAPs will detail these procedures for projects that require lower than standard RLs.

4.3 Instrument Calibration Requirements

Measuring and test equipment used in the field or laboratory will be subject to a formal calibration program. Instruments that measure a quantity or that are expected to perform at a stated level will be subject to calibration. Calibration of equipment may be performed internally using reference equipment and standards, or externally by agencies, manufacturers, or instrument service vendors.

Documented procedures will be used for calibrating measuring and test equipment and reference equipment. Whenever possible, widely accepted procedures, such as those published by ASTM and EPA, and procedures provided by equipment manufacturers, will be adopted. Where pre-established information is not available, procedures will be developed considering the type of equipment, stability characteristics of the equipment, required accuracy and precision, and the effect of error on the quantities measured. At a minimum, documentation of procedures will include:

- Type of equipment calibrated
- Reference equipment and standards used
- Calibration method and sequential actions
- Acceptance tolerances

- Frequency of calibration
- Data recording form
- Data processing methodology
- Any special instruction.

Specific calibration procedures are described in the individual analytical methods and/or in equipment manufacturer's documentation.

Measuring, test, and reference equipment will be calibrated at prescribed intervals and/or as part of operational use. Frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values given in national standards, intended use, effect of error on the measurement process, and operational experience. For laboratory equipment and instrumentation, calibration procedures and frequencies can be found in the laboratory's Standard Operating Procedures (SOPs), QA Manual (QAM), and/or the referenced analytical methods.

In some cases, particularly for field equipment, scheduled periodic calibration will not be performed because the equipment is not continuously in use. Such equipment will be calibrated on an "as needed" basis prior to use, and then at the required frequencies for as long as its use continues.

If equipment fails calibration and cannot be recalibrated, or equipment becomes inoperable during use, it will be removed from service and stored in a repair/maintenance area to prevent its inadvertent use. If equipment cannot be physically removed, it will be locked and tagged to indicate it is out of service. Such equipment will be repaired and properly recalibrated to the satisfaction of the appropriate laboratory manager or field supervisor. Equipment that cannot be adequately repaired or reconfigured will be replaced.

Results of activities performed using equipment that has failed calibration will be evaluated. If the successful completion of the activity is compromised by the equipment failure, the results of the evaluation will be documented, appropriate personnel notified, and an appropriate course of action determined.

Scheduled calibration of measuring and test equipment does not relieve any personnel of the responsibility of using functioning equipment properly. If an equipment malfunction is suspected, the device must be tagged or removed from service, inspected, and recalibrated. If it fails recalibration, the process described in this section will apply.

4.4 Elements of Quality Control

This section presents the QC requirements relevant to the analysis of environmental samples that will be followed during all analytical activities at the fixed-base laboratory. The implementation of the QC program will ensure that the data produced are of known quality that will satisfy Data

Quality Objectives (DQOs) and meet or exceed the requirements of the standard methods of analysis.

4.4.1 Laboratory Control Samples

Laboratory control samples (LCS) are analyte-free water or sand spiked with known concentrations of target analytes. A LCS will be prepared and analyzed by the laboratory with each batch of CLJ samples. Whenever an analyte in an LCS is outside the acceptance limit, corrective action shall be performed. After the system problems have been resolved and system control has been reestablished, all samples in the analytical batch shall be reanalyzed for the out-of-control analyte(s). When an analyte in an LCS exceeds the upper or lower control limit and no corrective action is performed or the corrective action was ineffective, the appropriate validation flag shall be applied to all of the affected results.

4.4.2 Matrix Spike/Matrix Spike Duplicate Samples

Many of the analytical methods used specify spiking duplicately-prepared sample matrix aliquots of approximately every twentieth sample with one or more of the analytes of interest (referred to as an MS/MSD pair). The percent recoveries from each spiked sample and the RPD between the spiked pairs provide an assessment of the precision and accuracy of the method for these analytes in the matrix being analyzed. These percent recoveries and RPDs can be compared to the established acceptance criteria to assess whether the sample matrix is negatively impacting the sample analysis.

In some instances, it can be difficult to assess whether a matrix effect is actually occurring, or whether there is some problem with the analytical process. LCS and field duplicate results will be evaluated to provide an assessment of whether the analytical system is in control.

4.4.3 Surrogates

Surrogates are organic compounds that are similar to target analytes but that do not typically occur naturally and do not interfere with the target analytes. They are spiked into samples and quality controls for organic analyses and used to assess accuracy. Whenever surrogate recoveries are outside of established acceptance ranges, corrective action must be performed. Corrective action may include re-analysis at dilution or appropriately flagging the data.

4.4.4 Internal Standards

Internal standards (IS) are measured amounts of select compounds added to samples between preparation and analysis. They aid in verification of calibration during analysis. Corrective action is required for any IS results that fall outside established acceptance criteria.

4.4.5 Retention Time Windows

Retention time windows apply to Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC) analyses. They aid in qualitative identification of target compounds. Required procedures for calculating retention time windows are defined in SW-846 method 8000B.

4.4.6 Interference Check Samples(ICS)

The ICS is used in Inductive Coupled Plasma (ICP) metals analysis to verify correction factors. They are run at the beginning and end of each analytical sequence as per the method.

4.4.7 Method Blanks

A method blank sample will be prepared and analyzed by the laboratory in association with each batch of samples analyzed in support of CLJ investigations. The method blanks will be treated according to the same preparation or extraction methodology used for analyzing the actual project samples. These blanks will demonstrate the absence of fugitive contaminants in the laboratory reagents, materials, and glassware used during sample preparation. The resulting analytical data will be used to evaluate the data obtained from project samples, should the method blank indicate the presence of fugitive contaminants. Samples associated with this batch method blank will be qualified with a “B” for each analyte detected in the method blank. No analytical data will be corrected for the presence of analytes in blanks.

The presence of analytes in a method blank at concentrations greater than the RL indicates a need for corrective action. Corrective action shall be performed to eliminate the source of contamination prior to proceeding with analysis. After the source of contamination has been eliminated, all samples in the analytical batch shall be prepared and reanalyzed. When an analyte is detected in the method blank, and in the associated samples and corrective actions are not performed or are ineffective, the appropriate validation flag shall be applied to the sample results.

4.4.8 Equipment Blanks

Equipment blanks are analyte-free water poured over and through sampling devices to determine the effectiveness of decontamination procedures. They shall be prepared just prior to select field samples and shall be analyzed for the same suite of tests as the field samples.

4.4.9 Trip Blanks

Trip blanks are prepared by the laboratory and kept with the sample bottles from shipment by the laboratory until return with field samples. The trip blanks will only be analyzed for volatile organic constituents and are used to assess the possibility of contamination by sample bottles and/or field procedures.

4.4.10 Field Duplicates

Field duplicates are co-located samples collected during sampling events. The original sample and its duplicate will both be analyzed for the same suite of tests. Detectable concentrations will be used to calculate RPD. The RPD should be less than established control limits to verify that sampling and homogenization procedures are adequate to provide representative samples.

5.0 Data Quality Objectives

As defined in the EPA guidance document entitled *Data Quality Objectives Process for Superfund* (EPA, 1993a), DQOs are qualitative and quantitative statements that specify the quality of data required to support decisions during investigation and remedial response activities. The approach is the same with a CERCLA or RCRA activity. DQOs are applicable to all data collection activities, and the level of detail and data quality needed will vary based on the intended uses of the data.

The DQO process helps define the purpose for which environmental data will be used and sets guidelines for designing a data collection program that will meet regulatory objectives. The process also provides a logical, objective, and quantitative framework for determining the time and resources that will be used to generate the data and the quality of that data.

The development of DQO requirements and the planning process as they apply in the investigations and remedial/corrective actions conducted at CLJ are discussed in project work plans (WP). Site-specific DQO determinations and requirements are presented in task-specific SAPs. An example project quality control objectives table is presented in Appendix A.

5.1 Data Categories

The DQO process provides a logical basis for linking QA/QC procedures to the intended use of the data. Data categories were developed to assist in the interpretation of the data. The categories that have been created and will be used in the activities conducted at CLJ are:

- Screening data with definitive confirmation
- Definitive data.

These two data categories are associated with specific QA and QC elements, and may be generated using a wide range of analytical methods. The particular type of data to be generated depends on the qualitative and quantitative DQOs developed during application of the DQO process.

5.1.1 Screening Data with Definitive Confirmation

Screening data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. Sample preparation steps may be restricted to simple procedures, such as dilution with a solvent, instead of elaborate digestion and cleanup. Screening data provide analyte identification and quantification, although the quantification may be relatively imprecise. One third of the screening data should be confirmed using analytical methods and QA/QC procedures and criteria associated with definitive data. Screening data without associated confirmation data are not considered to be data of known quality.

The generation of screening data requires the application of the following QA/QC elements:

- Sample documentation (location, date and time collected, batch, etc.)
- Chain of custody (when appropriate)
- Sampling design approach (systematic, simple or stratified random, judgmental, etc.)
- Initial and continuing calibration
- Determination and documentation of detection limits using standard method guidance
- Analyte(s) identification
- Analyte(s) quantification
- Analytical Precision Determination: a predetermined number of duplicate aliquots are taken from at least one thoroughly homogenized sample; the duplicate aliquots are analyzed, and standard laboratory QC parameters (such as RPD) are calculated and compared to method-specific performance requirements specified in the task-specific SAP
- Analytical Accuracy Determination: accuracy will be measured by evaluating the recovery of spiked compounds, analysis of standards, or analysis of reference materials and comparing the measured value to the known value. Accuracy is typically expressed as percent recovery
- Definitive Confirmation: one third of the screening data should be confirmed with definitive data as described in the following section.

5.1.2 Definitive Data

Definitive data are generated using rigorous analytical methods, such as approved EPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce tangible raw data in the form of paper printouts or computer-generated electronic files. Definitive data will be generated at the fixed-base laboratory. For the data to be definitive, either analytical or total measurement error must be determined.

The generation of definitive data involves the application of the following QA/QC elements:

- Sample documentation
- Chain of custody
- Sampling design approach
- Initial and continuing calibration
- Determination and documentation of detection limits
- Analyte(s) identification
- Analyte(s) quantification
- QC blanks (method, equipment, trip)
- LCS recoveries

- Matrix spike recoveries
- PE samples (when specified)
- Analytical error determination (measures accuracy of the analytical method)
- Total measurement error determination (measures overall precision of the measurement system from sample acquisition through analysis).

5.2 Quality Assurance Objectives(QAO) for Analytical Data

QC procedures are operations employed during sample collection and chemical analysis to support and document the attainment of established QA objectives. QA objectives are the detailed specifications for precision, accuracy, representativeness, comparability, and completeness (collectively referenced as PARCC), already defined. QA measures, as defined in OPNAVINST 5090.1B Chapter 25, NAVSEA T0300-AZ-PRO-010, and National Environmental Laboratory Accreditation Program (NELAP) quality system requirements, will be implemented for this program. The elements of chemical data quality management involved in the QA program described in these documents include document review, analysis of field QA samples, generation of the chemical QA report, validation of commercial laboratory, and the assignment of QA responsibilities. Any deviations to the QA program as defined in these documents will be noted in the task-specific SAP and will require the approval of the Project Manager and Project Chemist. The QAO established in this QAPP should be used for data quality review. In regards to measurement data quality, the QA/QC program shall include the following QA objectives:

- Provide a mechanism for the on-going control and evaluation of measurement data quality
- Provide measures of data quality in terms of PARCC to assess whether the data meet the project objectives and can be used for their intended purpose.

The primary objective of the chemical measurement data is to generate sufficient information to determine the presence or absence of chemical contamination within the sites' media and to determine the nature and extent of any contamination present. The chemical measurement data

is then used to evaluate the potential remedial activities. Data acquired through the sample collection phase must be defensible. The quality objectives for the chemical measurement data specify the "quality" of the data needed to enable project personnel to make decisions (e.g., a decision to pick one remediation technique over another). As such, the DQO determine the type and quantity of data needed to make a decision, as well as the measurement objectives (precision, accuracy) for each type of measurement data collected.

An example of the project quality control objectives for CLJ is included in Appendix A of this QAPP. The task-specific SAPs should be referenced for actual DQO for each site. The objectives will be accomplished by ensuring that the following analytical guidelines are met:

- Collect and analyze samples under controlled situations using standard methods
- Obtain usable and defensible analytical results.

The representativeness of the measurement data is a function of the sampling strategy and will be achieved by following the procedures discussed in this SAP. The quality of the analytical results is a function of the analytical system and will be achieved by using standard EPA SW-846 Update III or other accepted methods and the QC systems discussed in this section. The basis for assessing PARCC and the specific calculations for data quality measurements are presented in Section 4.0.

6.0 Analytical Procedures

The analytical objective for this program is to provide data that most accurately reflect the constituents present at each sample location. The objective will be met through the selection of the appropriate sample collection, sample preparation, and analytical methods. The process of selecting the analytical methods and procedures for this or any other project is based on the anticipated sample matrix, composition, required sample volume, and analytes/compounds of interest.

6.1 Chemical Analysis Program

Samples will be prepared and analyzed using the EPA SW-846 Update III or other accepted methods. For LANTDIV, E&E has a specific laboratory procurement procedure. Periodically, bids are sent to laboratories which are capable and certified to perform Navy work and have maintained a good relationship with E&E. Of these laboratories, five or so are selected based on price and facility capacity. These selected laboratories may each be considered for CLJ work. The Project Chemist in charge of E&E/LANTDIV work must assess which of the selected laboratories is the best option for a given task from CLJ. The laboratories will maintain and follow SOPs based on current EPA methods for each analysis. Appropriate laboratory personnel will be trained in the proper use of laboratory SOPs, referenced analytical methods, and general laboratory procedures and practices before analyzing samples from CLJ. The assigned laboratory for any given task will be responsible for documenting training of personnel and having these records available for review during audits. The laboratory department supervisors, laboratory Project Manager (PM), laboratory QA Officer, and laboratory director must provide the needed support and supervision of the staff as it relates to the implementation of the analytical program for CLJ.

The laboratory participating in the analytical program will be equipped with the proper analytical instrumentation necessary to complete the desired sample analysis, while also meeting the project DQO. The analysts performing the sample preparation and analysis shall be familiar with the preparation and analytical methodologies selected, proper instrument operation, instrument calibration, QC requirements, and instrument preventive maintenance. The laboratory utilized will provide a well-documented analytical data package that meets or exceeds the project-required deliverables.

Each instrument used to analyze samples in conjunction with this project will be set up, calibrated according to the procedures specified, and operated according to the selected analytical methodology. Instrument setup, calibration, and operation will be documented in the run log. Any deviations from these procedures also will be documented in the laboratory case narrative that precedes the analytical data packages of every sample delivery group. QC sample analyses will be performed according to the type and frequencies specified by each method in order to verify instrument performance periodically during routine analyses. All recommended calibration and calibration frequencies specified in the analytical methods will be met by the laboratory performing the analysis.

6.2 Non-standard or Modified Standard Methods

Generally, the laboratory providing analytical services to CLJ will be required to adhere to the methods and performance criteria specified in this QAPP. However, it is possible that at some time during the course of the program, it may be necessary to employ non-standard or modified versions of the methods defined in this QAPP. This situation will most likely arise for one of two reasons: (1) project requirements necessitate that non-standard or modified methods be performed, or (2) a laboratory must perform a different method than the method specified in the QAPP due to sample matrix or contamination. Based on the guidance provided in EPA SW-846 Update III and other accepted methods, modifications to the methods are allowed, providing performance criteria are met.

Project-driven non-standard or modified analytical method requirements must be well defined and communicated effectively to the contracted laboratory personnel during the task planning and preparation stage and prior to implementation in the field. Any specialized requirements should include a discussion of the following subjects:

- Sampling method/equipment (includes special calibration and decontamination procedures)
- Additional or specialized field QC sampling requirements
- Sample handling, preservation, and shipping
- Laboratory handling/storage
- Sample preparation and analysis methods
- Additional or specialized laboratory QC analytical requirements
- Special data reporting requirements.

It must be determined that the laboratory can successfully perform the method, demonstrate and document its effectiveness at meeting the task-specific analytical goals, and meet certain reporting and data validation requirements. Because the method implemented is non-standard or modified from the original, new techniques and procedures may be developed by the laboratory to meet these additional requirements. This may entail having the laboratory write a new, method-specific SOP. The details of how the laboratory will implement the method, report the data, and validate the data will be included.

If independent method validation of a modified protocol is to be performed, additional requirements may be placed on the laboratory. The laboratory should be prepared to provide documentation of the demonstrated PARCC and MDL of the non-standard or modified method. This may require the laboratory to perform the following activities:

- MDL Study
- Accuracy Assessment
- Performance Evaluation Study
- Precision Assessment
- Method Comparison.

Some or all of these activities may be used to validate the performance of non-standard or modified methods before they are used to analyze actual field samples. Results from all completed method validation programs will be reported formally and kept in the project central files.

7.0 Corrective Action

The need for corrective action occurs when a circumstance arises that threatens the quality of the data output. For corrective action to be initiated, awareness of a problem must exist. In most instances, the personnel conducting the field work and the laboratory analysis are in the best position to recognize problems that will affect data quality. Awareness on their part can frequently detect minor instrument changes, drifts, or malfunctions, which can then be corrected, thus preventing a major breakdown of the system. If major problems arise, field and laboratory personnel are in the best position to determine the proper corrective action and initiate it immediately, thus minimizing data loss. Therefore, the field sampling and laboratory analysis personnel will have a prime responsibility for recognizing the need for a corrective action report (CAR). Each non-conformance shall be documented by the personnel identifying the issue. For this purpose, a variance log, testing procedure record, notice of equipment calibration failure, results of laboratory analysis QA tests, audit report, internal memorandum, or letter shall be used as appropriate. Documentation shall include:

- Identification of the individual(s) originating the non-conformance documentation
- Description of the non-conformance
- Any required approval signatures
- Method(s) for correcting the non-conformance (corrective action) or description of the variance granted
- Schedule for completing corrective action.

Documentation in the form of a CAR shall be made available to project and laboratory management and the QA Officer. It is the responsibility of the laboratory PM, laboratory analysis coordinator, and/or QA Officer to notify appropriate personnel of the non-conformance. Affected samples will be listed on the CAR.

Decisions on whether to take corrective action and what action(s) to take will be made by the PM or the QA Officer. When a corrective action is taken by any of the operations or analytical laboratory personnel, they will be responsible for notifying the QA Officer so that, if deemed necessary, QA surveillance of the affected sampling or analysis system can be intensified. CARs will become part of the final report submittals or the supporting data files.

A second recognition level of the need for corrective action will be determined by the QA Officer, who will determine the need for corrective action from the results of laboratory audits and from a review of the QA data generated during the study. The QA Officer will be responsible for initiating corrective action by immediately notifying the analytical PM during the sample analysis phase. The appropriate management will then be responsible for instituting corrective action and verifying that the corrective actions did produce the desired results.

Ultimately, the personnel performing and checking the sampling and analysis procedures and results must participate in decisions to take corrective actions. To reach the proper decision, each individual must understand the program objectives and data quality required to meet the objectives established in the QAPP. DQOs for this program are discussed in Section 5.0. Personnel involved with the project will receive or have available to them an approved copy of this QAPP and will be informed of these objectives. The individuals performing the analyses will have the responsibility to notify the laboratory PM whenever a measurement system is not yielding data within these objectives. The laboratory PM will then notify the Project Chemist of the problem.

If a situation arises requiring corrective action, the following closed-loop corrective action system will be used:

- Define the problem
- Assign responsibility for investigating the problem
- Investigate and determine the cause of the problem
- Determine corrective action course to eliminate the problem
- Assign responsibility for implementing the corrective action
- Determine the effectiveness of the corrective action and implement
- Verify that the corrective action has eliminated the problem
- If not completely successful, loop back to first step.

Change from original plans and specifications must be expected. Change does not imply a non-conformance to the work, but simply means that original plans must be altered because of information gained or events that have occurred during the work. A change may have no overall effect on the quality of the final work product, or it may require redirection of the work. Project changes will be reported, evaluated, and documented as necessary so that the actual course of the work, if differing from the original plan, can be demonstrated and justified. These changes will be documented using project variance reports, internal memoranda, or field reports. It is the responsibility of all project personnel to appropriately identify the need, anticipate the required change of scope, and document this proposed change to senior management. The documentation will then be made available to CLJ, the PMs, and the QA Officer as required for approval. Prior to implementation, the effect of the change on the project will then be evaluated and approved by CLJ and contractor PMs and, as appropriate, the QA Officer and any contractor management. Following this evaluation, the actual change in scope of work planned may be revised if necessary. As the change is implemented, the QA staff may institute an audit program to evaluate the success of the change in addressing the actual encountered conditions.

8.0 Data Reduction, Validation, and Reporting

The data reduction, validation, and reporting procedures described in this section will ensure that complete documentation is maintained, transcription and data reduction errors are minimized, the quality of the data is reviewed and documented, and the reported results are properly qualified.

8.1 Data Management

The primary data management activities for the CLJ program will include:

- Data transfer from field and laboratory activities to a project filing system
- Data management to ensure that data are stored and output in a manner that continues the chain of custody
- Requirements review to ensure that plans for data collection were fulfilled
- Analytical data validation that will report final data to be used
- Analytical and field data evaluation resulting in a report of guidance to be followed for using project data
- Reporting functions, which may include outputting data for report tables, statistical analysis, interpretation of data, and electronic transfer.

The laboratory is responsible for reporting data in hard copy form to the Project Chemist. The Project Chemist is responsible for ensuring that data are validated, evaluated, and stored according to project requirements.

8.2 Data Reduction

Laboratory data verification includes dated and signed entries by analysts and group leaders on the worksheets and logbooks used for samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data.

Steps and checks used to validate precision and accuracy of the measured parameters and to support their representativeness, comparability, and completeness include:

- Description of the calibration performed
- Description of routine instrument checks (noise levels, drift, linearity, etc.)
- Documentation of the traceability of instrument standards, samples, and data
- Documentation of analytical methodology and QC methodology
- Description of the controls taken to determine and minimize interference contaminants in analytical methods (use of reference blanks and check standards for method accuracy and precision)
- MS recoveries and RPDs between the MS and MSD
- Description of routine maintenance performed
- Documentation of sample preservation and transport when shipped elsewhere.

Laboratory validation responsibilities are as follows:

- ***Level 1, Technical Data Review.*** Each laboratory analyst shall review the quality of his/her work based on an established set of guidelines. The review criteria as established in each method and as stated in the laboratory QAM shall be used. The review shall, at a minimum, ensure that: (1) sample preparation information is correct and complete; (2) analysis information is correct and complete; (3) the appropriate SOPs have been followed; (4) analytical results are correct and complete; (5) QC samples are within established QC limits; (6) special sample preparation and analytical requirements have been met; and (7) documentation is complete (any anomalies have been documented and forms complete, holding times documented, etc.). This data review shall be documented by using a checklist form and by signature and date of the reviewer.
- ***Level 2, Technical Review.*** The Level 2 review shall be performed by a supervisor or data review specialist whose function is to provide an independent review of the data package. This review shall also be conducted according to an established set of guidelines and is structured to ensure that: (1) all appropriate laboratory SOPs have been followed; (2) calibration data are scientifically sound, appropriate to the method, and completely documented; (3) QC samples are within established guidelines; (4) qualitative identification of sample components is correct; (5) quantitative results are correct; (6) documentation is complete and accurate (any anomalies have been documented and forms complete, etc.); (7) the data are ready for incorporation into the final report; and (8) the data package is complete and ready for data archive. Level 2 review shall be structured such that all calibration data and QC sample results are reviewed and all of the analytical results from at least 10 percent of the samples are checked back to the sample preparation and analytical bench sheets. If no problems are found with the data package, the review is complete. If any problems are found with the data package, an additional 10 percent of the sample results shall be checked back to the sample preparatory and analytical bench sheets. This cycle then repeats until either no errors are found in the data set checked or all data have been checked. All errors and corrections noted shall be documented. Level 2 data review shall also be documented on a checklist with the signature and date of the reviewer.
- ***Level 3, Administrative Data Review.*** Level 3 review is performed by the QA Officer or the PM at the laboratory. This review shall be similar to the review as provided in Level 2, except it shall provide a total overview of the data package to ensure its consistency and compliance with this instruction. All errors noted shall be corrected and documented. Level 3 data review shall also be documented on a checklist with the signature and date of the reviewer.

The standard turnaround time for laboratory activities is 21 calendar days. Expedited turn-arounds will be necessary in some activities. These special requirements will be identified in the task-specific SAP. Unless otherwise noted, hard copy and electronic delivery of all data reports should adhere to the stated turnaround times.

8.3 Laboratory Reporting

The laboratory will report the data in a format that will allow data validation to take place; this report will be similar to a Contract Laboratory Program (CLP) data package deliverable. This means that the sample results should be able to be recreated from the data presented in the package. The raw data required will include laboratory instrument printouts calibration records, sample preparation records, spiking information, and dilution records. CLP-type data qualification flags will be applied as appropriate to the analytical reports by the laboratory. In addition, the laboratory will present reports that will contain enough information for flagging the remaining data according to EPA functional guidelines, including date prepared, date analyzed, sample results, dilution factors, spike levels and percent recoveries, calibration summaries, blank results, and laboratory duplicate results.

The format and content of a data report depend on site-specific needs and objectives. However, the following items are applicable to all data presentation and will be included:

- The final data presentation shall be checked in accordance with data verification requirements and approved by the laboratory technical director
- Data are presented in a tabular format whenever possible
- Data will be formatted as a Certificate of Analysis
- Each page of data is identified with the project number and name and date of issue.

Appropriate data presentation including:

- Sample ID number provided to the laboratory and laboratory-assigned ID
- Chemical parameters analyzed, reported values, and units of measurement
- Reporting limit of the analytical procedure
- Data for chemical parameters reported with consistent significant figures for samples
- Results of QC sample analysis
- Achieved accuracy and precision of data
- Footnotes referenced to specific data, if required to explain reported values
- Analytical methods specifically referenced on all laboratory reports (any method modification will be included in the case narrative)
- Data for field QC samples reported in the same format as action samples (a modified data package consisting of QA/QC summary data sheets will be provided for all internal laboratory QC samples).

The laboratory PM is responsible for preparing each technical report.

8.4 Data Quality Assessment

The data review and evaluation task that will be performed in support of the project work will consist of reviewing three areas of data quality. The QC checks used to assess measurement precision are field duplicates and MSD samples. The QC checks used for the assessment of measurement accuracy are LCSs and MSs. The third group of QC data reviewed are the results for field and laboratory blanks. A raw data review of the laboratory reports will be performed to ensure all samples were analyzed as requested.

All samples collected at CLJ will be analyzed in accordance with the task-specific SAPs.

The laboratory reports and raw data will be reviewed for the following.

- Holding times
- Calibration
  - Initial
  - Initial and continuing calibration verification
- Blanks
- Inductively coupled plasma (ICP) interference check sample
- LCSs
- Duplicate sample
- MS/MSD sample
- ICP serial dilution
- Sample result verification
- Field duplicates
- Overall assessment of data.

Data will be reviewed for adherence with this QAPP unless otherwise specified in the task-specific SAP. Special attention will be paid to holding times, blank concentrations, spike recoveries, and duplicate repeatability. The QC report will summarize the data review and explain the rationale behind qualifying the data.

8.5 Data Validation

Analytical data will be validated against method QC requirements and DQO presented in the task-specific SAPs. All data validation activities will be performed using the EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (February 1994, EPA-540/R-94/013) (EPA, 1994b). For parameters that are not specifically addressed by the EPA's validation guidelines, evaluation procedures similar to these references and the laboratory's submitted SOPs are followed.

Validation will involve data flagging, blank evaluation, evaluation of duplicates, and statistical evaluation of data. All data will be qualified according to CLP flagging criteria. The data validation report will include a narrative explanation of the samples to which the report applies, a reference to the criteria or procedures used to qualify the data, and a description of which results were qualified and why.

8.5.1 Blank Contamination Verification

All analytical results reported by the laboratory will be evaluated for blank contamination. Field QC samples will be associated with corresponding original samples on the sample collection logs, which are completed during sampling. Upon receipt of data packages, the QC associations will be completed, indicating all laboratory QC samples, their sample numbers, the date they were run, and the associated field samples.

When all blanks are associated with the appropriate field samples, each field sample will be evaluated for blank contamination according to the EPA National Functional Guidelines "5x/10x Rule." The results of this evaluation will be entered into the database and a summary of these results will be prepared.

8.5.2 Background

For investigation activities, background samples may be collected and reviewed to determine if any chemicals of concern (COC) are present and at what concentration. Site data will then be compared to background to determine if site concentrations are sufficiently different from background concentrations. If background samples contain significant concentrations of site compounds, or if it is determined that site data contain concentrations of these compounds sufficiently different from background, determinations will be made concerning the appropriate actions. Possible actions could include relocating background samples, collecting additional background or site samples to determine the extent of contamination, or suggesting additional cleanup steps to be implemented.

8.6 Record Keeping

At least two copies of all data forms and deliverables will be generated during the project and sorted at different locations. Wherever practical, original forms will be archived at the E&E office in Virginia Beach, Virginia, and copies will be retained by the laboratory and field personnel. Analytical data will be archived for at least 7 years by the laboratory.

9.0 Preventive Maintenance

The primary objective of a preventive maintenance program is to promote the timely and effective completion of a measurement effort. The preventive maintenance is designed to minimize the downtime of crucial sampling and/or analytical equipment due to expected or unexpected component failure. In implementing this program, efforts are focused in three primary areas:

- Establishment of maintenance responsibilities
- Establishment of maintenance schedules for major and/or critical instrumentation and apparatus
- Establishment of an adequate inventory of critical spare parts and equipment.

9.1 Maintenance Responsibilities

Equipment and apparatus used in environmental measurement programs fall into two general categories:

- Equipment permanently assigned to a specific laboratory
- Field sampling equipment available for use on an as-needed basis (e.g., field meters, pumps, and vehicles).

Maintenance of laboratory instruments is the responsibility of the laboratory contracted to perform the analytical portion of this program. Generally, the laboratory manager or department supervisor is responsible for the instruments and equipment in his or her work area. The laboratory manager will establish maintenance procedures and schedules for each major equipment item. This responsibility may be delegated to laboratory personnel, although the managers retain responsibility for ensuring adherence to prescribed protocol. All laboratories are bound by analytical contractual agreements to maintain the ability to produce data that meet the project objectives and to follow method specifications. This ensures that adequate spare parts, maintenance, schedules, and emergency repair services are available.

Maintenance responsibilities for field equipment are assigned to the Site Supervisor or appropriate representative. The field team using the equipment is responsible for checking the status of the equipment prior to use and reporting any problems encountered. The field team is also responsible for ensuring that critical spare parts are included as part of the field equipment checklist. Non-operational field equipment is removed from service and a replacement obtained.

All field instruments will be properly protected against inclement weather conditions during field work. Each instrument is specially designed to maintain its operating integrity during variable temperature ranges that are representative of ranges that will be encountered during hot- or cold-weather working conditions. At the end of each working day, all field equipment will be taken out of the field and placed in a cool, dry room for overnight storage.

9.2 Maintenance Schedules

The effectiveness of any maintenance program depends to a large extent on adherence to specific maintenance schedules for each major equipment item. Other maintenance activities are conducted on an as-needed basis. Manufacturers' recommendations will provide the primary basis for the established maintenance schedules, and manufacturers' service contracts provide the primary maintenance for many major instruments (e.g., GC instruments and analytical balances).

9.3 Spare Parts

Along with a schedule for maintenance activities, an adequate inventory of spare parts is required to minimize equipment down time. The inventory includes those parts and supplies that:

- Are subject to frequent failure
- Have limited useful lifetimes
- Cannot be obtained in a timely manner should failure occur.

The Site Supervisor and the respective laboratory managers will be responsible for maintaining an adequate inventory of spare parts. In addition to spare parts and supply inventories, a backup supply of much of the equipment and instrumentation for the field sampling will be maintained.

9.4 Maintenance Records

Maintenance and repair of major field and laboratory equipment will be recorded in logbooks. These records will include documentation of the serial numbers of the equipment, the person performing the repairs, the date of the repair, the procedures used during the repair, and proof of successful repair prior to the use of the equipment.

10.0 Systems and Performance Audits

To verify the performance of work activities in accordance with approved work instructions and QA program requirements, a system of planned and documented surveillances, inspections, and performance evaluations may be implemented. Both internal activities and the activities of subcontractors may be monitored. These assessments may include, but are not limited to, the following areas:

- Conformance to DQO
- Supplier capabilities and performance
- Transmittal of information
- Record control and retention.

It is the ultimate objective, through the implementation of this auditing system, to measure and judge consistency of approach among the various field and analytical service contractors supporting CLJ investigative activities. The methodology, the way the methods are executed, the conditions of the environment in which they are performed, and the qualifications of the personnel completing the work are all part of the scope of a complete auditing program. If variability from these sources can be reduced through a successful audit program implementation, then the consistency of the samples collected, the data gathered, the analyses performed, and the results reported can be improved.

10.1 General Auditing Techniques

Surveillance. Surveillance, or the witnessing of quality-related activity execution, provides a method to perform a review of project activities with less formality than inspections. Surveillance may be scheduled or unscheduled and may involve contractor project management and technical project staff in addition to representatives of CLJ and LANTDIV. At the discretion of these individuals, surveillance may be conducted on any project activity at any time.

Inspections. To verify the execution of specific activities in accordance with approved work instructions and project requirements, a system of inspections may be utilized.

Inspections are primarily visual examinations, but possibly may include recording measurements and tests of materials and equipment being used, techniques employed, and final product. Each inspection will be planned to provide the inspector(s) with the opportunity to observe all phases of the subject activity that may affect the end result, to minimize delays in the work activity, and to provide early detection of plan non-conformances. Examinations, measurements, or tests will be performed as necessary and documented to verify the desired performance. Documentation will generally be on a field log and/or an inspection checklist.

Results, descriptions of findings, and recommended corrective actions for auditing activities will be presented in a memorandum or formal inspection report. The memorandum report will be issued within 30 calendar days of audit completion and sent to the appropriate PM, QA Officer (if this individual did not participate in the inspection), and the individual contractor or subcontractor directly supervising the activity inspected. A written response from the contractor project staff or subcontractor will be required to indicate the corrective actions taken to resolve any issues noted. QA personnel will then verify the corrective actions as part of future follow-up audit activities.

10.2 Field Auditing Procedure

Auditing of field procedures by both surveillance and inspection may be conducted by the contractor QA Officer who is responsible for the scope of work. The content of these audits will be highly dependent on the type of field activity that is being audited. Activities as diverse as sample collection, well installation, soil boring, excavation, construction, and remediation may be included. The auditor must have sufficient knowledge of the site activity to accurately observe, comment, and ask appropriate questions of the participating contractor staff; therefore, in addition to the contractor QA Officer, the contractor PM may authorize additional personnel who are knowledgeable to participate.

The field audits will generate as a final deliverable an audit assessment report that evaluates the current state of implementation of project technical and QA plans. These reports will identify areas of potential concern as audit findings and document what the observed conditions or procedures were at the time of the audit, what they should have been, and the corrective action steps required to formulate a systematic change. Follow-up audits will then be scheduled and performed to address the findings of the previous audit and judge the progress of the audited group.

These audit reports, once compiled, should be circulated appropriately to the field and laboratory management staff for evaluation. Finalized audit reports will be retained in the project central files for future reference.

10.3 Laboratory Auditing Procedure

Contract laboratories that contribute data to the project database shall participate in a system of organized laboratory surveillance and quality systems audits. Internal surveillance that focuses on one specific area should be performed periodically by the laboratory QA Officer. Project quality system audits may be performed by E&E personnel. The focus of the system audit will vary depending on the type of analytical support provided by the audited laboratory.

The laboratory audits will generate, as a final deliverable, an audit assessment report that evaluates the current state of implementation of project technical and QA plans. These reports will identify areas of potential concern as audit findings and document what the observed conditions or procedures were at the time of the audit, what they should have been, and the corrective action steps required to formulate a systematic change. Follow-up audits will then be scheduled and performed to address the findings of the previous audit and judge the progress of the audited group.

These audit reports, once compiled, should be circulated appropriately to the field and laboratory management staff for evaluation. Finalized audit reports will be retained in the project central files for future reference.

APPENDIX A

EXAMPLE PROJECT QUALITY CONTROL OBJECTIVES

QC PROGRAM OBJECTIVE

All work is a process which can be planned, performed, assessed, and improved upon. Utilization of the principles described in the Program Quality Control Plan will achieve the mission of the Team which is to provide professional services with competence and integrity and the highest level of quality expected.

It is the objective of the Program to verify and document that all work performed is completed in accordance with the contract and delivery order specifications. This is accomplished by inspecting and testing work and production.

It is the responsibility of the Project QC Manager to verify the QC requirements for the project are being met and implemented.

COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan and prior to start of work, the QC Manager will meet with the Contracting Officer to discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used, administration of on-site and off-site work, and coordination of the contractor's management, production and the QC Manager's duties with the Contracting Officer. As a minimum, the Contractor's personnel required to attend shall include the Project Manager and QC Manager. Minutes of the meeting shall be prepared by the QC Manager and signed by both the Team and the Contracting Officer/AROICC.

QUALITY CONTROL MEETINGS

Quality Control Meetings are generally conducted biweekly or as otherwise directed by the ROICC. Quality control meetings for this project will initially be conducted every week. Meeting will be held at the E&E office trailer designated location specified by contracting officer/AROICC site and will be chaired by the Project Quality Control Manager (QCM). At a minimum the attendees at the meeting should include: Project Manager, ROICC, and AROICC. From time-to-time other site, program management, and facility personnel will attend the meeting.

It is the responsibility of the QCM to prepare and publish the minutes to the meeting within 2 working days after the meeting. All attendees of the meeting should review the minutes for accuracy and completeness.

As a minimum, the following shall be accomplished at each meeting:

a) Review the minutes of the previous meeting
b) Review the schedule and the status of work:

    i) Work or testing accomplished since last meeting
    ii) Rework items identified since last meeting
    iii) Rework items completed since last meeting

c) Review the status of submittals

    i) Submittals reviewed and approved since last meeting
    ii) Submittals required in the near future

d) Review the work to be accomplished in the next two weeks and documentation required. Schedule the three phases of control and testing:

    i) Establish completion dates for rework items
    ii) Preparatory phases required
    iii) Initial phases required
    iv) Follow-up phases required
    v) Testing required
    vi) Status of off-site work or testing
    vii) Documentation Required

e) Resolve QC and production problems
f) Address items that may require revision the QC plan such as changes in procedure

A sample format for the QC meeting is attached.

PRODUCTION MEETING

The Monthly Production should be held separately from the Quality Control Meeting. The focus of the Production Meeting is Project Cost and Schedule. The meeting is to be conducted by the Project Manager who is responsible for the preparation of minutes and an agenda. At a minimum the attendees of this meeting are: AROICC, ROICC, Project Manager and Project Technician.

The meeting should focus on the review of the project performance report and schedule. Detailed discussions regarding issues that will impact schedule and cost should yield solutions or action items that lead toward solutions. This meeting is scheduled at the convenience of the ROICC and normally follows the project QC meeting.

Weekly CQC Meeting Minutes
(Month, Day, Year)
Work Performed from (00/00/00 to 00/00/00)
Contract # N62470-93-D-4000, D.O.
O & M
MCB Camp Lejeune
Jacksonville, NC

ATTENDEES:
(List Names and Organizations)

1. RESULTS OF REVIEW OF PREVIOUS CQC MEETING MINUTES
(Record results of review and any required corrections)

2. VARIANCE REQUEST/REQUEST FOR INFORMATION/WORK DIRECTIVES STATUS:

2a. Variance Request and Request for Information Approved Since Last Meeting/Pending Approval

VR/RFI No.	DATE INITIATED	DESCRIPTION	STATUS

3. Work Directives Initiated Since Last Meeting/Pending Approval

WD No.	DATE INITIATED	DESCRIPTION	STATUS

3. SCHEDULE AND STATUS OF WORK:

3a. Work accomplished since last meeting

DEFINABLE FEATURE	ACTIVITY	PREPARATORY PHASE DATE	INITIAL PHASE DATE	FOLLOW-UP STATUS*

*working or completed

3b. Work to be accomplished before the next scheduled meeting (includes both on-site and off-site work and testing).

SCHEDULED PREPARATORY PHASES PRIOR TO NEXT MEETING	SCHEDULED DATE

4. REWORK STATUS:

4a. Rework items identified and pending correction

DATE IDENTIFIED	DESCRIPTION OF REWORK REQUIRED	ESTIMATED COMPLETION DATE

4b. Rework items completed since last meeting

DATE IDENTIFIED	DESCRIPTION OF REWORK REQUIRED	DATE COMPLETED

5. STATUS OF SUBMITTALS:

5a. Submittals reviewed and approved since last meeting

SPEC. SECTION	SUBMITTAL DESCRIPTION	DATE RECEIVED	DATE APPROVED	APPROVED BY

5b. Submittals pending approval

SPEC. SECTION	SUBMITTAL DESCRIPTION	DATE SUBMITTED	APPROVALS REQUIRED BY

5c. Submittals required in the near future

SPEC. STATION	SUBMITTAL DESCRIPTION	DATE REQUIRED

6. TESTING:

6a. Test performed since last meeting

SPEC. SECTION	DESCRIPTION OF TEST	DATE COMPLETED

6b. Testing scheduled prior to next meeting

SPEC. SECTION	DESCRIPTION OF TEST	SCHEDULED DATE

6c. Testing results pending/received since last meeting

SPEC. SECTION	DESCRIPTION OF TEST	STATUS

7. DOCUMENTATION:

Documentation required prior to next meeting

DOCUMENTATION DESCRIPTION	DATE REQUIRED

8. STATUS OF AS-BUILTS: (Define changes made since last meeting and provide an explanation for as-built drawings that are not up-to-date).

9. QC AND PRODUCTION PROBLEMS DISCUSSED AND RELATED RESOLUTIONS:

10. OTHER ITEMS DISCUSSED:

11. ACTION ITEMS:
(include items that may require revising the QC plan or changes in procedure)

12. DATE OF NEXT SCHEDULED QC MEETING: